BREVIORA

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AN EXTINCT SOLENODONTID INSECTIVORE FROM HISPANIOLA

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During the summer of 1958, Drs. Clayton E. Ray and A. Stanley Rand carried on field work[1] for this museum in Puerto Rico and the Dominican Republic. Particular attention was paid to cave deposits, and a number of previously unexplored caves were examined. The cave containing the material reported on here is in the Sierra de Neiba near Rancho La Guardia in the Province of San Rafael, Dominican Republic; it has no local name. Situated in a limestone cliff and accessible only by a nearly vertical climb of some 30 feet, the cave contains a number of chambers connected by narrow passages.

Bones were encountered in the deposits on the floor of the antechamber and of the first chamber beyond it. In the antechamber two layers are present, an upper, dark grey to black one some six inches thick, and a lower, reddish-brown one eight to ten inches in depth. The upper layer is either lacking or negligible in depth in the first chamber, the lower there attaining a thickness of six to twelve inches. Scanty remains from the upper dark layer include *Rattus*, which clearly indicates post-Columbian age. No introduced forms were encountered in the reddish-brown layer, which contains indigenous rodents and the three species of *Nesophontes*[2] known to have inhabited the island, together with scanty remains of bats, birds, lizards, and solenodontids. In addition to the bones of the extinct form described below, one specimen of *Solenodon paradoxus* was obtained. This is the left horizontal ramus of a young individual

[1] Partly supported by a Sigma Xi-RESA grant-in-aid.

[2] *N. paramicrus, hypomicrus* and *zamicrus* of Miller (1929). *N. "paramicrus,"* the largest of the three, agrees in size with the Cuban *N. micrus*, from which Miller separated it on molar characters. I have examined several hundred specimens of the Hispaniolan form and compared them with Cuban material. The supposed differences are not constant and I have so far been unable to find others that might validate Miller's species.

with I_2 in process of eruption and alveoli of the other teeth (M.C.Z. no. 7260); as far as I am aware this find constitutes the first fossil (or subfossil) record of the species. Judging from the good preservation and completeness of most of the bones from the reddish-brown layer, Dr. Ray (MS field notes) is inclined to doubt that their occurrence is a result of owl-roost accumulation. Most of the material, including all the solenodontid remains, was found in the first chamber of the cave. As regards the age of the layer, all that can presently be said is that it is almost surely pre-Columbian.

During their stay in the Dominican Republic, Drs. Ray and Rand were accompanied by Professor Eugenio de Jesús Marcano F., Universidad de Santo Domingo, whose aid was invaluable in all phases of the work. It is a pleasure to name the extinct solenodontid in his honor. Dr. Ray will discuss the rodents from this and other localities in the course of his comprehensive studies on the Antillean Rodentia. I am indebted to Miss Linda Loring for the cleaning, sorting and cataloguing of the other groups represented in the collection. The drawings are by Mrs. Dorothy Marsh. I have been fortunate indeed as regards comparative material, thanks chiefly to the excellent series of *Solenodon* in the Mammal Department of the museum. Thirty-six mandibles, fifteen humeri and six ulnae of *S. paradoxus* and three mandibles of *S. cubanus* have been available. I have not seen limb bones of *S. cubanus*, but published figures (e.g. Peters 1863) indicate that these do not differ appreciably, either in structure or in proportions, from those of the larger species.

INSECTIVORA

SOLENODONTIDAE

Antillogale[1] gen. nov.

Type: — *A. marcanoi* sp. nov.

Distribution: — Quarternary, Hispaniola.

Diagnosis: — Differing from *Solenodon* as follows: P_4 and lower M smaller relative to size of jaw, lower M with lingual cleft between paraconids and metaconids deeper, paraconid wings directed more anteriorly, paraconids consequently farther from metaconids, low ridge between bases of paraconids and metaconids isolating slight valleys at bases of trigonid basins, anterior

[1] The Antilles, plus γαλή, weasel.

cuspules below bases of paraeonids very weakly developed, heels less broadly shelf-like labially. Post-dental portion of ramus larger relative to anterior portion. Humerus and ulna shorter, much wider relative to length, ulna with pit proximo-medial to sigmoid notch.

Antillogale marcanoi sp. nov.

Type: — M.C.Z. no. 7261, incomplete right ramus of mandible with P_3-M_2 and alveoli of other teeth.

Hypodigm: — Type and the following specimens: M.C.Z. nos. 7262, incomplete left ramus with P_4-M_2 and alveoli of P_3, M_3; 7266, posterior portion of left ramus with alveoli of M_3, juvenile; 7263, right humerus lacking ectepicondyle; 7264; left humerus lacking proximal epiphysis; 7265, right ulna.

Horizon and locality: — Late Pleistocene or Recent; unnamed cave 2 kilometers SE of Rancho La Guardia, Municipio de Hondo Valle, Provincia de San Rafael, República Dominicana.

Diagnosis: — As for the genus.

Description: — Knowledge of the lower incisors, canine and anterior premolar derives solely from alveoli. On this evidence, the relative sizes of the incisors and the degree of enlargement of I_2 were essentially as in *Solenodon*, as was the relative size of the single-rooted canine. The anterior premolar would appear to have been larger than P_3, to about the degree seen in *S. paradoxus*. P_3 is small relative to P_4, nearly as much so as in *S. paradoxus*, and much smaller, both actually and relatively, than in *S. cubanus*. In structure it is very similar to the corresponding tooth of *S. paradoxus*, and rather different from the larger, more globular one of *S. cubanus*. The paraconid of P_4 is a larger cusp than in the majority of specimens of *S. paradoxus* and much larger than in *S. cubanus*. The essential characters of the molars have been given in the diagnosis and can be seen in the figures: I may add that, as far as these teeth are concerned, *Antillogale* could only with difficulty be distinguished generically from *Apternodus*.

The horizontal ramus is shorter and more slightly built than in *Solenodon* and, instead of the two, or even three, mental foramina almost invariably present in that form, there is only a single large one, situated beneath P_3. The postdental portion of the mandible is relatively large and robust. Whereas the horizontal ramus is rather shorter than in *S. cubanus* the posterior part is rather larger and longer, being intermediate in

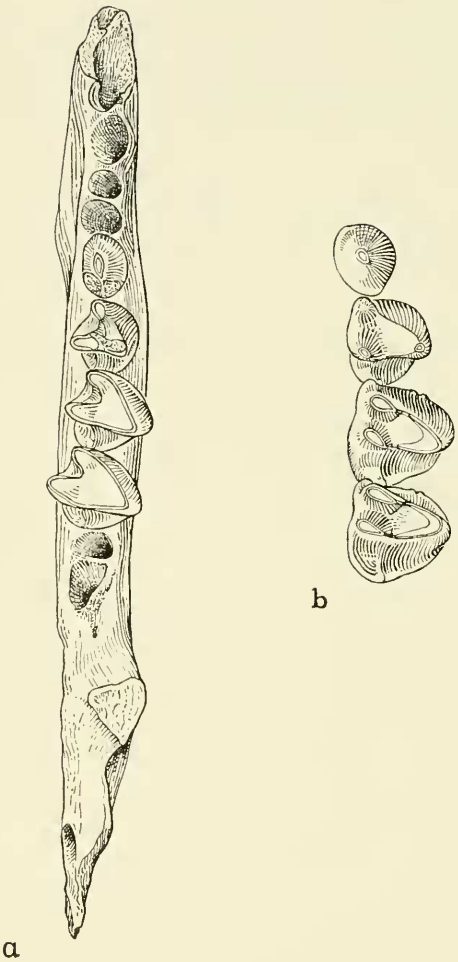

Figure 1. a) *Antillogale marcanoi,* type, M.C.Z. no. 7261, incomplete right ramus, dorsal view. b) *Solenodon paradoxus,* M.C.Z. no. 12384, crown view of right P_3-M_2. × 3.

these respects between *cubanus* and *paradoxus.* The coronoid process, so far as can be judged from the juvenile M.C.Z. 7266 and the incomplete M.C.Z. no. 7262, appears to have been less tapering than in the living species. The base of the anterior border of the process is convex, as in *S. cubanus,* and not excavated as it is in *S. paradoxus.* The masseteric fossa is small,

relatively and actually, oval in outline, and not very sharply defined. The marginal process, for the insertion of M. digastricus, is comparable to those of the living forms. The angle is not complete in any of the specimens but enough is preserved in M.C.Z. no. 7262 to demonstrate that, in contrast to *S. paradoxus* and in agreement with *S. cubanus,* the ventral border is not

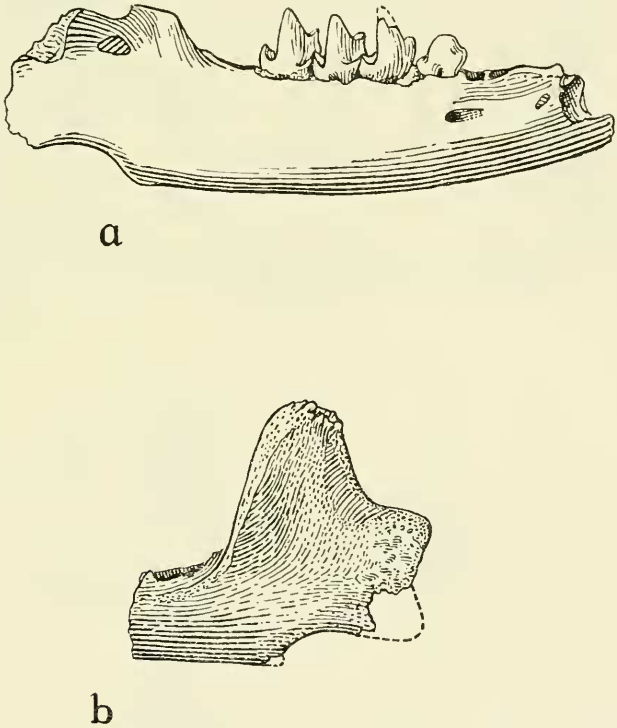

Figure 2. *Antillogale marcanoi.* a) M.C.Z. no. 7261, type, incomplete right ramus, lateral view. b) M.C.Z. no 7266, incomplete left ramus, lateral view, × 2.

downcurved and that, consequently, there is no lunate notch between angle and marginal process.

The limb bones differ markedly in proportions from those of *Solenodon.* The humerus of *Antillogale* may be summed up as a bone having the width but not the length of that of *S. paradoxus,* and hence massive. The relative lengths of humerus and ulna appear to be essentially the same in both. The ulna, like

the humerus, is shorter than but equally as wide as that of the living species; other differences of note between the two are the presence in the fossil of a very distinct pit proximo-medial to the sigmoid notch and of a rugose interosseous border.

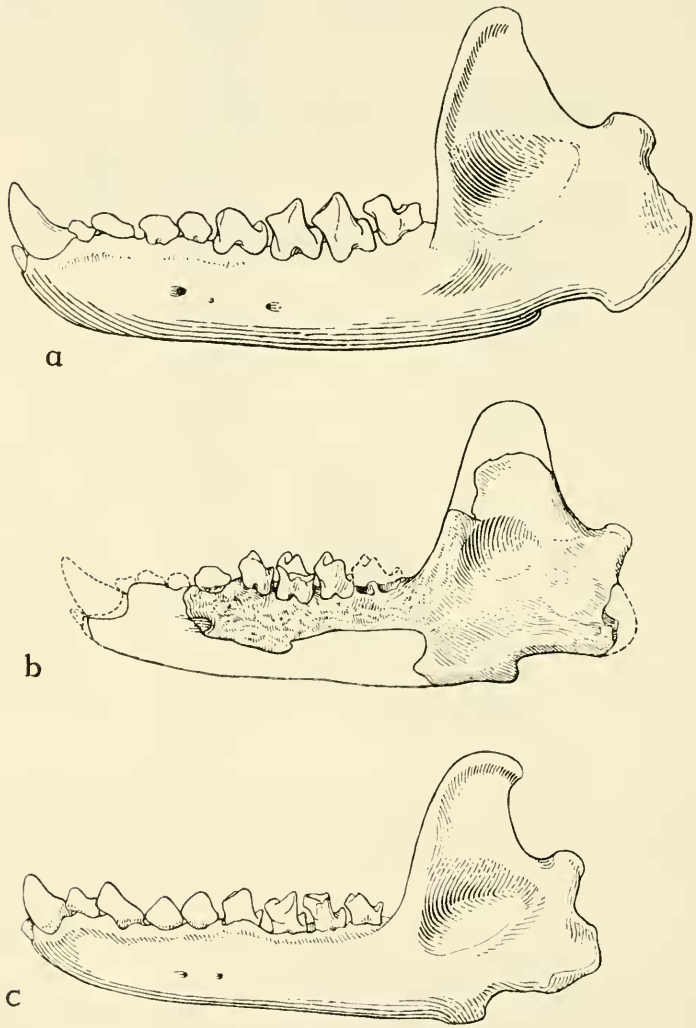

Figure 3. Lateral views of left rami of a) *Solenodon paradoxus*, M.C.Z. no. 34828, b) *Antillogale marcanoi*, M.C.Z. no. 7262, and c) *Solenodon cubanus*, Y.P.M. no. 1203. In b) areas in solid outline are restored from M.C.Z. nos. 7261 and 7266. × 3/2.

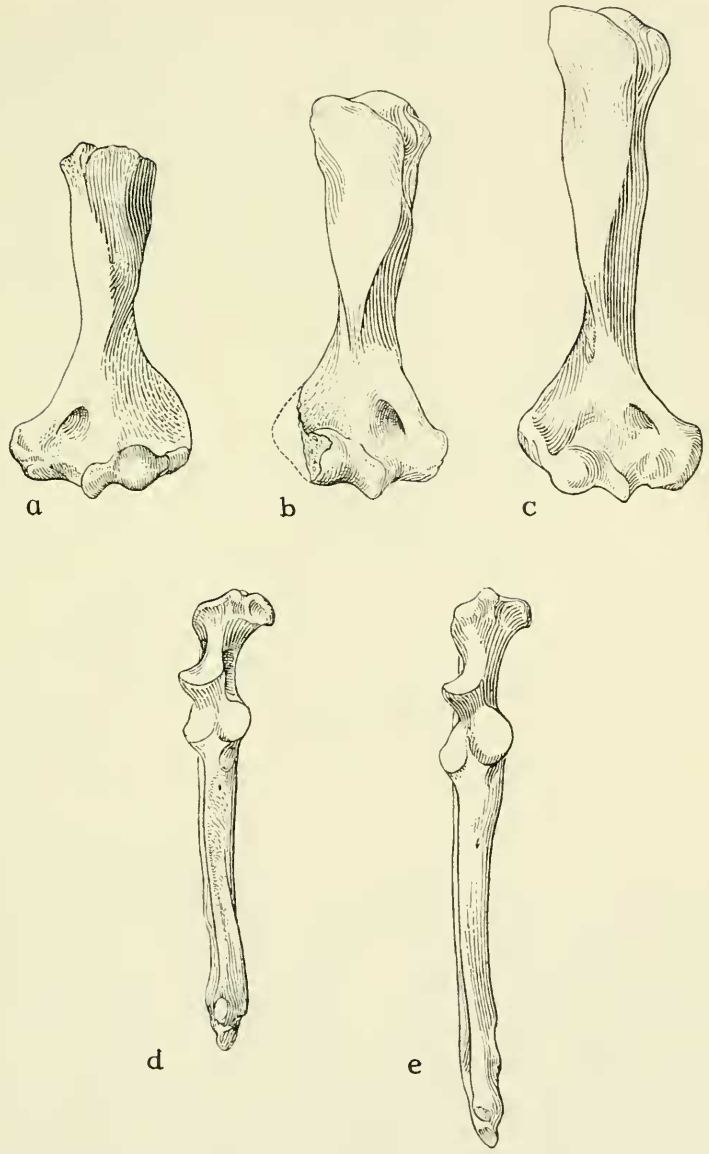

Figure 4. Anterior views of humeri (a-c) and ulnae (d, e). *Antillogale marcanoi,* a) M.C.Z. no. 7264, b) M.C.Z. no. 7263, d) M.C.Z. no. 7265. *Solenodon paradoxus,* c) and e) M.C.Z. no. 12416. × 4/3.

Measurements in mm.

	M.C.Z. nos.	
	7261	7262
P_3, length	2.7	—
width	2.0	—
P_4, length	3.1	3.2
width	2.3	2.5
M_1, length	3.0	3.4
width	2.9	—
M_2, length	3.3	3.4
width	3.0	3.3
Depth of ramus beneath M_1	6.5	—
	7263	7264
Humerus, total length	40.0	—
a.-p. diameter of proximal end	9.9	—
tr. diameter of proximal end	10.9	—
a.-p. diameter at center of shaft	7.1	6.6
tr. diameter at center of shaft	7.3	6.5
a.-p. diameter of distal end	5.1	4.9
tr. diameter of distal end	—	17.7
tr. diameter of trochlea	—	9.2
	7265	
Ulna, total length	45.6	
a.-p. diameter of olecranon	4.8	
tr. diameter of olecranon	7.4	
tr. diameter of proximal articular surface	6.4	
a.-p. diameter at center of shaft	4.3	
tr. diameter at center of shaft	2.3	
a.-p. diameter at distal end	3.9	
tr. diameter at distal end	2.8	

Discussion: — The Solenodontidae have thus far been known from one genus with two species. Splitting of these taxa has of course been attempted. *Solenodon cubanus* has been made the type of *Atopogale* by Cabrera (1925), and Barbour (1944) has described a second Cuban species, *S. poeyanus*, based on pelage characters. Barbour explicitly stated that he could detect no cranial or dental distinctions. Aguayo (1950) and Koopman and Ruibal (1955) have regarded this form as a subspecies of *cubanus*. The latter authors noted that some fragmentary remains (M.C.Z. no. 7054) from a cave in Camagüey, which they referred to the living species, were somewhat larger than Recent specimens of *cubanus* examined by them. In recent years, members of the Sociedad Espeleológica de Cuba have obtained further material, including some skulls, from the Province of Havana. Thanks

to Sr. Oscar Arredondo, I have seen most of these specimens; they also represent individuals rather larger than, although not otherwise different from, any in the small sample (3) of *cubanus* available to me. It is of some interest that the type of *poeyanus* (M.C.Z. no. 6957) is also rather larger than this sample, a point not mentioned by Barbour; in fact there is agreement in this respect between the type and these fossils (or subfossils). To conclude from this that *poeyanus* is distinguishable from *cubanus* on the basis of size and that the fossils so far found are referable to the former would, I think, be premature. The available series are too small to rule out accidents of sampling. The size difference is slight and if the size range of *cubanus* is comparable to that shown for *paradoxus* by the adequate series at hand we could be dealing simply with segments of a normal distribution. Reinforcing caution is the fact that one of the two mandibles from Maisi, Oriente (M.C.Z. no. 10065), mentioned by Allen (1918) is smaller than the other fossils. Whatever the solution of this minor problem may prove to be, I agree entirely with Aguayo and with Koopman and Ruibal that subspecies, at most, are involved. There is at present no good evidence of more than one species of *Solenodon* in Cuba. *Atopogale* is recognized, either as a genus or as a subgenus, by some authors. There can be no question that *paradoxus* and *cubanus* are clear-cut taxa but they seem to me, as to others, to merit no more than specific rank. *Antillogale marcanoi* helps to clarify matters here; it is sharply distinct from either of the living species and the latter share most of the characters that differentiate them from it.

Antillogale is quite evidently a member of the Solenodontidae. The structure, although not the proportions, of the known limb bones; the general structure of the mandible, and especially the presence of a marginal process; the small I_1 and the degree of enlargement and mode of implantation of I_2 (as revealed by the alveoli) — all these characters combine to place this conclusion beyond reasonable doubt. Only in lower molar structure is there a closer resemblance to members of another family, the Apternodontidae. The difference here I believe to be the result of specialization in the *Solenodon* phylum. The molars of the two living species give the impression of having undergone anteroposterior compression of the trigonids. A majority of the characters in which they differ structurally from those of *Antillogale* could be directly correlated with such a change. Aside from molar structure, the differences between the extinct and the living species are chiefly of a proportional nature, as

pointed out above. *Antillogale* evidently had a somewhat shorter facial region and much shorter, more heavily built fore limbs than *Solenodon*. It may well have been more fossorial in habits.

Solenodon with its two species, one on each of the larger West Indian islands, has always been one of the most isolated of mammals, zoogeographically — and even taxonomically — speaking. As knowledge of the past history of mammals has improved, this isolation has become, if anything, even more apparent. In earlier days it was at least possible to assume a common ancestry with if not membership in the Tenrecidae. There is now no real evidence for such an assumption — tenrecids, as far as the record goes, appear always to have been African and Madagascan in distribution — and we must look elsewhere for close relatives and possible ancestors. The only group that seems to me to come close to fulfilling the requirements is the Apternodontidae, a family which at least had the merit of inhabiting North America, the only probable source area.[1] The described forms, the Oligocene *Apternodus* and *Oligoryctes*, were certainly not ancestral to the solenodontids, but apternodontids are now known in North America at least as far back as the Bridgerian Eocene.[2] The possibility, I would go so far as to say probability, exists that solenodontids were derived from relatively unspecialized apternodontids that inhabited the Central American peninsula during the earlier Tertiary. Rafting of the ancestral stock to the Antilles, for rafting was certainly involved, may have taken place in the later part of the Eocene, at roughly the same time as the rafting of the ancestors of caviomorph rodents and platyrrhine primates to South America. This event, if it occurred at the time suggested, would have insured for the solenodontids a very long residence in the West Indies. There has, I feel, been some reluctance to accept such a possibility, a reluctance based, consciously or unconsciously, on the fact that *Solenodon* alone has hitherto represented the family and on the assumption that we now have an adequate idea of the Pleistocene, or at least pre-human, faunas of the archipelago. I strongly doubt if we do have a good

[1] Allen's belief (1918) that solenodontids were derived from nesophontids, a view recently supported by McDowell (1958), is not at all convincing. McDowell's attempt to read *Apternodus* out of the Insectivora is utterly unrealistic, being in large part based on misinterpretation of the fossils he examined.

[2] I am indebted to Dr. Craig C. Black for the opportunity of examining a specimen from Tabernacle Butte, Wyoming. This is the earliest known eutherian with zalambdodont molars. Contrary to earlier statements (including one of mine made on the basis of the literature), the molars of the Paleocene *Palaoryctes* are not zalambdodont in structure, nor are they even pre-zalambdodont in the way those of *Potamogale* are.

knowledge of the faunas (cf. Koopman and Williams 1951); as regards birds at any rate Sr. Arredondo and I will demonstrate the contrary in a forthcoming paper. And now, in *Antillogale*, we have a hint that there may have been a radiation of solenodontids on the Antilles in some degree comparable to that of the tenrecids on Madagascar.

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